

Summary Report of the Workshop on Interactions Between Sea Turtles and Vertical Lines on Fixed-Gear Fisheries

MARCH 31 AND APRIL 1, 2008
NARRAGANSETT, RHODE ISLAND



NOAA National Marine Fisheries Service

SUMMARY REPORT OF THE WORKSHOP ON INTERACTIONS BETWEEN SEA TURTLES AND VERTICAL LINES IN FIXED-GEAR FISHERIES

MARCH 31 AND APRIL 1, 2008
NARRAGANSETT, RHODE ISLAND

FINAL REPORT PREPARED FOR NOAA'S NATIONAL MARINE FISHERIES SERVICE,
NORTHEAST REGIONAL OFFICE

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MARCH 2009

EXECUTIVE SUMMARY

Sara McNulty, NMFS Northeast Regional Office

NOAA's National Marine Fisheries Service (NMFS), Northeast Regional Office (NERO) hosted a workshop March 31 and April 1, 2008, to discuss interactions between sea turtles and the vertical lines of fixed-gear fisheries. Interactions between fixed fishing gear and sea turtles have been documented in the coastal waters of the northeastern United States and eastern Canada. Entanglement in vertical lines can result in various injuries or even death to sea turtles—the severity of the injury may not be known or visible at the time of disentanglement. The workshop was intended to foster information exchange and improve our understanding of when, where, and how sea turtles interact with the vertical lines of fixed fishing gear. The workshop involved participants from Federal, state, and local governments, academia, industry, and nongovernmental organizations. The workshop began with a series of presentations on several topics, including sea turtle distribution and available information on sea turtle interactions with vertical lines. The participants were then broken into three smaller facilitated groups, which discussed several topics including ways to reduce entanglement, more effectively evaluate injuries, and improve disentanglement response.

The workshop organizers would like to thank Rhode Island Sea Grant for facilitating this meeting, the Village Inn Resort, Narragansett, R.I., for providing a productive and comfortable venue, the presenters, and all of the participants for their contributions to the discussions.

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This publication is sponsored in part by Rhode Island Sea Grant, under NOAA Grant No. NA080AR4170691. The recommendations and general content presented in this report are those of the authors and/or workshop participants and do not necessarily reflect the views of NOAA or any of its sub-agencies. Further, the ideas generated at the meeting and included in this report do not necessarily reflect the position of all workshop participants, as consensus was not achieved or requested. The U.S. Government is authorized to produce and distribute reprints for governmental purposes notwithstanding any copyright notation that may appear hereon.

This report should be referenced as:

NOAA National Marine Fisheries Service. 2008. Summary Report of the Workshop on Interactions Between Sea Turtles and Vertical Lines in Fixed-Gear Fisheries. M.L. Schwartz (ed.), Rhode Island Sea Grant, Narragansett, R.I. 54pp.



TABLE OF CONTENTS

I. General Introduction	5
<i>Malia Schwartz, Rhode Island Sea Grant/University of Rhode Island</i>	
II. Presentations	6
A. Opening Remarks	6
<i>David Beutel, Rhode Island Sea Grant/University of Rhode Island</i>	
B. Endangered Species Act and Sea Turtle Life History	6
<i>Carrie Upite, NMFS Northeast Regional Office</i>	
C. Sea Turtle Distribution and Seasonality – Eastern Canada	6
<i>Mike James, Dalhousie University, Canada</i>	
D. Sea Turtle Distribution and Seasonality – Northeast United States	7
<i>Kara Dodge, Large Pelagics Research Center, University of New Hampshire</i>	
E. Sea Turtle Distribution and Seasonality - Virginia	7
<i>Susan Barco, Virginia Aquarium Stranding Response Program</i>	
F. Data on Sea Turtle Interactions with Vertical Lines in the Northeast United States	8
<i>Sara McNulty, NMFS Northeast Regional Office</i>	
G. Sea Turtle Disentanglement Network Response and Equipment	8
<i>Brian Sharp, Provincetown Center for Coastal Studies</i>	
H. Case Study: Traumatic Injury from a Constriction Wound on an Entangled Green Sea Turtle: Implications for Sea Turtle Disentanglement.....	8
<i>Susan Barco and Linda D'Eri, Virginia Aquarium Stranding Response Program</i>	
I. Atlantic Large Whale Take Reduction Plan: Overview of Regulations and Research Related to Vertical Lines	9
<i>Diane Borggaard, NMFS Northeast Regional Office</i>	
J. Gear Demonstration: Description of Different Configurations of Fixed Gear, Including Surface Systems	10
<i>Glenn Salvador, NMFS Northeast Regional Office, and Industry Volunteers</i>	
III. Breakout Group Discussions.....	11
<i>Facilitators: David Gouveia and Harry Mears, NMFS Northeast Regional Office, and Barbara Somers, Rhode Island Sea Grant</i>	
Introduction	11
Session 1: Options for the Reduction of Sea Turtle Entanglements in Vertical Lines	11

Session 2: Options for Improving Disentanglements.....	14
Future Steps	17
Appendix I - Agenda	18
Appendix II – List of Participants.....	20
Appendix III – Presentation Slides	24

I. General Introduction

Malia Schwartz, Rhode Island Sea Grant

Fishermen, state and Federal fisheries managers, gear technologists, nongovernmental organizations, sea turtle biologists, and sea turtle stranding and disentanglement network members came together in Rhode Island from March 31 to April 1, 2008, to share information and explore new ideas to address interactions between sea turtles and fixed fishing gear. Sea turtles become incidentally entangled in fixed fishing gear, and if unable to get free they may be fatally injured or drown. NOAA's National Marine Fisheries Service (NMFS) Northeast Regional Office (NERO) has documented these interactions in their region, which extends from Maine to Virginia. In response to fixed-gear entanglements, NMFS initiated the Sea Turtle Disentanglement Network (STDN) in 2002, but realized that disentanglement response is reactionary, and could benefit from a more proactive approach to address these interactions. NMFS enlisted Rhode Island Sea Grant to facilitate this workshop. The charge for the two days was to better understand how and why turtles become entangled in vertical lines, consider solutions and ideas to reduce entanglements, and improve entanglement response and reporting.

On the first day of the workshop, presentations included information on sea turtles in the region, such as life history, distribution, the nature of interactions with fishing gear, and STDN response to entanglements. The day concluded with a hands-on gear demonstration and description of the various gear configurations currently being used by the fishing industry. On the second day, participants engaged in breakout group discussions around the options for reducing sea turtle entanglement in vertical lines and for improving disentanglement. NERO will use the outcomes from these discussions to explore future research options and ideas that came out of the workshop.

This final report from the workshop includes summaries of each of the presentations made on the first day and the breakout group discussions from the second day. The appendices include the meeting agenda, a list of participants, and slides from each presentation. The hope is that the connections made among state and Federal agencies and stakeholder groups at the workshop, as well as outcomes and ideas from the group discussions, will ultimately lead to solutions that prevent the entanglement of sea turtles in the future.

II. Presentations

This section provides a brief summary of each presentation, but does not include all the details provided by each presenter. Presentation slides can be found in Appendix III.

A. Opening Remarks

David Beutel, Rhode Island Sea Grant/University of Rhode Island

David Beutel, the workshop facilitator, provided opening remarks, including a summary of the agenda, participants, and overall goals for the workshop. He stated that the workshop has brought together fishermen, state and Federal fisheries managers, gear technologists, nongovernmental organizations, sea turtle biologists, and sea turtle stranding and disentanglement network members to share information and explore new ideas for reducing entanglements and improving sea turtle disentanglement. The intention of the workshop was not to reach consensus, but to elicit a broad range of ideas and have all participants actively engage in the discussion.

B. Endangered Species Act and Sea Turtle Life History

Carrie Upite, NMFS Northeast Regional Office

Carrie Upite provided background information on the Endangered Species Act (ESA) and the sea turtle species that are found in the Northeast. She explained definitions for “endangered” and “threatened” as found in the ESA, and stated that according to the ESA, it is unlawful for anyone in U.S. waters to “take” an endangered or threatened species. The term “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. It is possible for Federal and non-federal entities, through specific permitting processes, to obtain a permit from NMFS or the U.S. Fish & Wildlife Service for activities that might incidentally take endangered or threatened wildlife.

Upite then provided information on the five sea turtle species found in the Northeast—leatherback, loggerhead, Kemp’s ridley, green, and hawksbill turtles. All are listed as either endangered or threatened under the ESA. She provided species profiles on these sea turtle species, including their size, distinguishing characteristics, primary prey, and general distribution. She then described the life history of sea turtles from nesting females through hatchling, juvenile, and adult life stages. In conclusion, she mentioned that Northeast waters are an important habitat for sea turtles. Sea turtles are generally found north of Cape Hatteras, N.C., from May through November each year, migrating north as water temperatures increase in the spring, and south as temperatures decline in fall. Nearshore waters provide developmental and foraging habitats for immature and sub-adult turtles of several species. Pelagic waters provide foraging habitat for leatherback and loggerhead turtles.

C. Sea Turtle Distribution and Seasonality – Eastern Canada

Michael James, Dalhousie University, Canada

Michael James has been researching leatherback sea turtles in Canada for 10 years. He presented information on the distribution of sea turtles, mainly leatherbacks, in eastern Canadian waters. Leatherbacks occur frequently in Nova Scotia waters, and there is a rich record of entanglements in fixed gear there. He provided information from his research, where he observed turtles entangled in gear, such as polypropylene rope, around their flippers or neck. James has witnessed several interactions where feeding leatherbacks swam directly into buoys and became entangled in the vertical line around the head and front flippers. He stated that

many turtles appear to survive these interactions, and solutions to reduce interactions are possible.

In Nova Scotia, commercial fishermen have a high level of cooperation with researchers on this issue, and together have developed protocols for releasing turtles, reporting bycatch, collecting samples, and reporting sightings. They also have produced a video for fishermen that demonstrates how to safely release turtles. James mentioned that leatherbacks can readily be released from fishing gear, and after the event is documented, it is best to disentangle and release the animal as quickly as possible, to increase the potential for the animal's survival. For this reason, commercial fisherman play an important role in the process, as they are already out on the water and often are able to quickly release turtles as they are encountered.

D. Sea Turtle Distribution and Seasonality – Northeast United States

Kara Dodge, Large Pelagics Research Center, University of New Hampshire

Kara Dodge is studying leatherback movements and behavior in New England. She presented data from the Cetacean and Turtle Assessment Program (CeTAP), a survey effort by University of Rhode Island researchers, which ran from 1978 to 1982, and covered an area from Cape Hatteras to southwest of Nova Scotia (Shoop and Kenney, 1992). The CeTAP survey showed the seasonality of turtle presence. During the survey period, the most commonly observed turtles were leatherbacks and loggerheads. There were 3,640 sightings of sea turtles during the survey period, with the greatest concentration of sightings in an area from Cape Hatteras to south of Long Island. There were a total of 128 leatherback sightings, with 99 sightings in the summer.

Dodge noted that there is an absence of sea turtle distribution studies. CeTAP, which occurred in the late '70s and early '80s, is the most recent survey on sea turtle abundance. Therefore, other data sets, such as strandings, sightings, and bycatch data, are used to help fill in the blanks. These data sets are opportunistic and do not always provide a clear picture of habitat use and turtle distribution.

Dodge also provided some information on her current research, which is utilizing GPS-linked satellite tags to track leatherbacks in their foraging grounds. Dodge has already tagged five entangled turtles off Massachusetts, and hopes to tag additional animals in the Northeast in the summer of 2008.

E. Sea Turtle Distribution and Seasonality – Virginia

Susan Barco, Virginia Aquarium Stranding Response Program

Susan Barco is the stranding coordinator for the Virginia Aquarium Stranding Response Program. She presented information on the species of sea turtles and types of injuries/interactions that generally occur in sea turtles stranded in Virginia. Loggerheads are the most commonly stranded sea turtle in Virginia, followed by Kemp's ridleys, then leatherbacks and greens, which strand at an equal rate. Barco mentioned that in Virginia there are approximately 200 to 500 strandings per year of all species. Strandings are most frequent near the mouth of the Chesapeake Bay, with a peak in strandings and sightings during the month of June.

Barco then discussed some of the common injuries documented in stranded turtles in Virginia. Vessel strike injuries are commonly seen, however it is often difficult or impossible to determine if the vessel strike occurred pre- or post-mortem. Hook and/or monofilament line ingestion, debris ingestion, and entanglement in monofilament line, nets, and vertical lines are also regularly observed. Barco stated that approximately one-third of sea turtles stranded in Virginia are documented with gear or have injuries consistent with gear interactions (e.g., constriction marks).

F. Data on Sea Turtle Interactions with Vertical Lines in the Northeast United States

Sara McNulty, NMFS Northeast Regional Office

Sara McNulty, the NERO Sea Turtle Stranding and Disentanglement program coordinator, provided information on the structure and purpose of both the stranding and disentanglement networks that operate in the Northeast. She then presented a summary of sea turtle entanglement data collected by the STDN between 2002 and 2007.

McNulty stated that from 2002 to 2007, NMFS received 144 reports of entangled turtles in the region, with 96 events confirmed. McNulty mentioned that when an event is reported to NMFS, it is considered unconfirmed unless photo documentation is received, or physical response by a trained responder can confirm the event and the species of sea turtle involved. Over the six-year period from 2002 to 2007, entanglements were reported in all months from May through October, with the highest concentration of events occurring in August. Of the 96 confirmed events during this period, 87 events involved leatherbacks, eight involved loggerheads, and one involved a green turtle. Additionally, of the 96 confirmed events, 75 of the animals were alive and all were either partially or fully disentangled.

Sightings/entanglement reports from areas are more common where people are present to observe and call in the report (i.e., the more people, the more reports). NMFS requests for all responders to carefully document and/or recover the gear involved in the entanglement. Of the 96 confirmed events, NMFS has identified the gear type and fishery for 42 events. With regard to the remaining 54 events, gear identification is either pending or there was not enough information available to confirm the fishery involved. NMFS has confirmed sea turtle entanglements in the following fisheries: lobster, whelk, sea bass, crab, and research pot gear.

G. Sea Turtle Disentanglement Network Response and Equipment

Brian Sharp, Provincetown Center for Coastal Studies

Brian Sharp, rescue coordinator for the Provincetown Center for Coastal Studies (PCCS), discussed sea turtle disentanglement response in the Northeast. He presented the steps of disentanglement response, which include reporting, verification, standing by, assessment, documentation, and disentanglement. He also described the training provided to disentanglement responders and the equipment that has been developed by PCCS for both whale and sea turtle disentanglement response. All organizations in the STDN have been provided training and disentanglement tools by NMFS, in an effort to help provide a safe response environment for both the responders and animals.

Sharp noted that the disentanglement network was established, in part, because the individuals who find animals are often not prepared or willing to disentangle them. Additionally, the knowledge that can be gained from having trained responders document entanglements may be able to help answer questions about how and why entanglements in vertical lines occur, as well as the frequency in which they occur.

H. Case Study: Traumatic Injury from a Constriction Wound on an Entangled Green Sea Turtle: Implications for Sea Turtle Disentanglement

Susan Barco and Linda D'Eri, Virginia Aquarium Stranding Response Program

Susan Barco of the Virginia Aquarium presented a case study of a green sea turtle that was rehabilitated and released by the Virginia Aquarium Stranding Program in 2007. A live green turtle was found swimming in Virginia waters with a line and buoy entangled around its

right front flipper. The entanglement was a single wrap, and the turtle was easily disentangled. There was no apparent injury to the flipper. However, due to left eye inflammation, the animal was brought into a rehabilitation facility and treated with antibiotics. Six days later, an injury began to develop on the flipper. After two weeks the animal was completely lame, with inflammation and discoloration, followed by exposed bone, severe swelling, and deep tissue necrosis. The injury was treated and the animal was eventually released.

Barco presented this case as an example of a delayed injury (e.g., pressure necrosis) that was directly caused by an entanglement. The significance of this event is that it demonstrates how a seemingly minor wound degraded to a significant injury that may result in death if left untreated. Responders in the field would not be able to look at an animal's flipper and determine whether a pressure necrosis wound will occur. However, when discussing the issue and effects of entanglements, delayed pressure necrosis should be considered.

I. Atlantic Large Whale Take-Reduction Plan: Overview of Regulations and Research Related to Vertical Lines

Diane Borggaard, NMFS Northeast Regional Office

Diane Borggaard presented information on the Atlantic Large Whale Take Reduction Plan (ALWTRP). She stated that the Atlantic Large Whale Take Reduction Team (ALWTRT) was established in 1996 to advise NMFS on ways to reduce the serious injury and mortality of right, humpback, and fin whales (the plan also benefits minke whales) in various commercial gillnet and trap/pot fisheries. The ALWTRT is composed of fishermen, industry associations, environmental groups, state and Federal fishery managers, biologists, and other interested parties. The ALWTRP is an evolving plan and has been amended to meet Marine Mammal Protection Act (MMPA) and ESA mandates as NMFS and the ALWTRT learn more about why whales become entangled and how fishing practices might be modified to reduce the risk of entanglement.

The current ALWTRP includes various vertical line gear modifications. Two universal modifications address vertical line: no floating line at the surface, and fishermen are encouraged (although not required) to maintain knot-free vertical lines. The plan is also area-specific and calls for gear marking (on surface buoys and vertical lines) to help determine where entanglements are occurring and in what kind of gear. The plan requires weak links on buoys, flotation and/or weighted devices attached to the vertical line that are designed to break during a mouth entanglement, and sinking line is required for at least two-thirds of the upper vertical line in specific management areas. In some Federal waters in the Northeast, no single traps are permitted and only one vertical line is allowed for pot trawls ("trawl" refers to a string of multiple pots) with five or fewer traps.

Through the ALWTRT and rulemaking process, NMFS has gained much knowledge on vertical lines but additional information is needed. For example, many fishermen have noted that they need two vertical lines because, depending on weather, they need to be able to haul their gear from either end. Without this option, they have expressed safety concerns. Thus, when NMFS had previously required that only one vertical line be used in a specific ALWTRP management area, it might not have decreased the number of vertical lines in the water as expected, because fisherman began to split their pot trawls.

Recent ALWTRT meetings have focused on further discussion of ALWTRP principles related to lowering the profile of ground lines and reducing risk associated with vertical lines. In addition, NMFS has presented a matrix of options for further reducing risk associated with vertical lines, such as reducing separation of the buoys in the surface systems, and reducing the number of vertical lines, such as through an acoustic release, galvanic time release, or by increasing the number of pots/traps per trawl. This matrix also includes an implementation schedule with priorities and current status of research, among other elements.

J. Gear Demonstration: Description of Different Configurations of Fixed Gear, Including Surface Systems

Glenn Salvador, NMFS Northeast Regional Office, and Industry Volunteers

Glenn Salvador, NMFS fisheries liaison, presented information on the vertical line gear research that has been conducted under the ALWTRP. He mentioned that the focus of NMFS' gear research has been on the buoys, vertical (buoy) lines, and surface systems of fixed-gear fisheries, all primarily designed to prevent entanglements of large whales. Salvador noted several ideas that have been suggested as possible ways to reduce entanglements. Specifically, vertical line research has included time-tension bottom release, thwartable bottom link, buoy line messenger system, electric rope, lipid soluble rope, slick rope, stiff rope, glow rope, and a modified two-buoy system, all of which may or may not reduce large whale entanglements. Salvador mentioned that NMFS has also explored innovations that would reduce the number of vertical lines in the water, including acoustic releases and galvanic links. For additional information, please visit <http://www.nero.noaa.gov/whaletrp/plan/gear/index.html>.

III. Breakout Group Discussions

Introduction

The second day of the workshop consisted of two breakout group sessions: Session 1 addressed options for reducing sea turtle entanglements in vertical lines, and Session 2 evaluated options for improving disentangling and reducing injury. The workshop participants were divided into three facilitated breakout groups to work through the session topics. For each session, the breakout groups were given a series of questions to initiate discussion (see below). The questions were meant to provide a guide for the discussion, not to limit the scope of the discussion. Following each session, all workshop participants reconvened and reported on the discussion from each individual breakout group. A synthesis of the outcomes and primary discussion points from each session is presented below.

The information presented in this section represents a collection and overview of ideas from various workshop participants. As such, the ideas below are not necessarily reflective of all participants' ideas or viewpoints.

Session 1: Options for the Reduction of Sea Turtle Entanglements in Vertical Lines

Facilitators: David Gouveia and Harry Mears, NMFS Northeast Regional Office, and Barbara Somers, Rhode Island Sea Grant

Focus Questions — Session 1

- Are there ALWTRP gear modifications or planned gear research that may be helpful for sea turtles? Can any of the ALWTRP options be further modified to increase the benefits to sea turtles?
- What are some reasons sea turtles may become entangled in vertical lines?
- Has anyone witnessed a turtle becoming entangled in a vertical line? Can you describe the behavior you saw? Where did the turtle first encounter the line (e.g., at the surface near the buoy or under water)? What was the turtle's physical reaction when it became entangled?
- Can vertical lines be rigged differently to minimize entanglement?
- Are there deterrents that could be used to prevent turtles from approaching vertical lines?
- Besides vertical lines, are there other portions of pot/trap gear that may pose a problem for sea turtles? What about gillnet gear?
- What kind of gear research is needed to help minimize the risk of entanglement?
- What kind of sea turtle research may be helpful in minimizing the risk of entanglement?

Why sea turtles become entangled in vertical lines

Based on discussions, some participants felt that sea turtles become entangled in vertical lines by chance. Other factors may include curiosity, attraction to and/or feeding on epibionts and other biofouling organisms on the line and buoy. Foraging on organisms on the line/buoy may be particularly relevant to loggerhead interactions. However, one participant noted that leatherbacks may also be attracted to the buoys, which may resemble jellyfish. Several participants suggested that it may be more likely that gear is located in areas where turtles are foraging, therefore causing a greater likelihood of entanglement, as opposed to the turtles actively feeding off the gear. This may also explain cases in which turtles are found

entangled in float rope at the surface. For example, telemetry data for Cape Cod Bay (where sea turtle and vertical line interactions have been documented) show high sea turtle use in all areas of the Bay, which is also a densely fished area. Workshop participants also suggested that some turtles may become impinged or loosely entangled in vertical lines, but are able to free themselves.

Lastly, participants noted that in order to better determine how and why turtles become entangled, it would be helpful to have a characterization of all pot gear fisheries. For example, information should be compiled on the location, seasonality, and dynamics of the fisheries, gear configuration, and other characteristics.

Options for reducing entanglements

In all breakout groups, the major focus of this discussion centered on gear modifications, especially with respect to altering the type of line and/or minimizing the amount of line used. Suggestions included stiffening the line on the first 3 meters below the buoy; using sheaths over the top third of the line, using a “bungee cord–like tent pole” design to create a stiff line between the buoy and high flyer, which could then be broken down on the deck of a boat when hauled; setting the gear to prevent slack rope at the surface; using sinking breakaway line on the upper third of the line, such as what is currently used in the Rhode Island lobster fishery; decreasing the density of vertical lines in a particular area; and eliminating the use of a trailing buoy. Other suggestions for reducing interactions in vertical lines focused on the use of deterrents, including employing acoustic pingers (although hearing in sea turtles is poorly understood) or vibrant rope colors (e.g., glow rope). Finally, several gear modification ideas explored changes to the bridle lines between the pot and the vertical line, including adjusting the bridle lines, steadying clips to keep the bridle to the side of the gear, and using sinking ground lines. It was also acknowledged that fewer entanglements appear to occur in areas where fishermen use predominately leaded lines, rather than floating line. The use of leaded lines may not be an option for all areas, but such modifications to line would be worth investigating.

Participants also discussed how some modifications already required by the ALWTRP may provide ancillary benefits to sea turtles. One mandate in particular involves a year-round universal requirement for no floating line at the surface. Participants discussed how proper enforcement of this ALWTRP universal requirement may provide benefits to sea turtles.

Outreach efforts and working more closely with fishermen were other topics discussed as ways to reduce entanglements. Programs that encouraged fishermen and others to collect ghost gear, plastic bags, and debris were suggested, as was creation of a “leatherback alert system” that would trigger a shortened soak time for traps if a turtle became entangled and would alert the fisherman to check the gear. Gear cameras may also be useful to allow for observing turtle behavior around gear. Participants also discussed fishing effort reductions during seasons or months when sea turtles are observed at a higher abundance in certain areas.

Research needs

Research needs were discussed among participants. Such needs include research on and knowledge about sea turtles that would help minimize entanglements, and fishing gear research to reduce entanglements or minimize impacts on turtles.

Sea turtle research

The group discussed options and needs for research on sea turtles. Much of the discussion centered on the need for studies that examine turtle distribution and seasonality. For example, participants suggested the need for research regarding high-use areas for sea turtles, the effect of sea surface temperature on sea turtle distribution and movement, the distribution and availability of prey resources, and the effect of prey availability on sea turtle distribution. The use of satellite tagging and tracking methods, as well as enhanced stranding network

reporting, is beginning to increase our awareness on these topics, but much more information is needed to gain a clear picture of sea turtle movements in the Northeast waters. It was also acknowledged that collecting data on sea turtle distribution is often very difficult. For example, satellite telemetry data can give insight into habitat use and post-disentanglement survival; however, the devices are expensive and difficult to apply on leatherbacks, and the margin of error is large, which precludes relocation or visual inspection of a tagged animal.

Participants also emphasized the need for behavioral studies. Areas of behavioral research included assessing the behavioral and physiological response to an entanglement, the effect of stress on survival, and the use of sensory cues to navigate through the water. It was also suggested that more knowledge is needed on sea turtle feeding behavior around gear and whether leatherback sea turtles, in particular, are attracted specifically to the line, buoy, or the epibiota on the line. The use of video could be helpful in this research. Additionally, studies on captive turtles, such as loggerheads and greens, were also recognized as having potential for evaluating these factors.

Gear research

As sea turtles seem to become entangled most often in the top third of vertical lines, priority areas for gear research should focus on modifications to that section of the gear as well as trying to minimize the number of lines used and amount of rope at the surface. One modification presented was to make the top third of the vertical line stiffer. Some participants felt that research was needed to determine what level of stiffness would prevent turtle entanglements but would still be safe and efficient for the fishing industry (e.g., rope not coiling properly on the boat could pose a danger to fishermen). Other ideas included testing dipped versus non-dipped rope and different types of rope dips, as well as efforts to reduce the number of vertical lines while maintaining fishing efficiency.

Certain required gear modifications to prevent whale entanglements, such as the prohibition on float rope at the surface, should also help sea turtles. Unfortunately, the weak links that work on baleen whales are not designed for rolling behavior, so they are unlikely to be useful in releasing turtles. Another concern in applying modifications that work for whales to turtles is the differences in gear strength versus animal force—i.e., things that will give/release when a whale encounters the line are too strong to release when a turtle interacts with the gear. Other topics for research included time-tension cutters, modifications to other types of vertical lines, including mooring lines and aquaculture lines, determining the rate of inshore versus offshore entanglements, and the feasibility of using spotter aircraft to detect entanglements.

Another area of research or data collection identified was the nature of the sea turtle entanglement in vertical lines. Some participants suggested that it would be beneficial to have a better understanding of how and where the animals become entangled, both geographically and in the gear configuration. It was suggested that additional information be collected on geographic location of the entanglement, depth of entanglement, gear type, number and location of wraps on the body, the ability of the turtle to surface when entangled, and whether the animal was able to drag the gear. Much of this information is already collected by the stranding and disentanglement networks, but more systematic data collection could be helpful.

When moving forward with gear research, some participants requested NMFS continue the dialog and maintain a relationship with fishermen. One participant also urged caution with comprehensive regulations based on gear research because environmental conditions and fishing conditions vary among locations and fisheries. For example, a gear modification that may work well in the Maine lobster fishery may not be effective or practical in a crab fishery in Virginia. Participants noted that conducting cooperative research with fishermen and identifying ways to maximize their expertise would be very valuable to progress on this issue.

Session 2: Options for Improving Disentanglements

Facilitators: David Gouveia and Harry Mears, NMFS Northeast Regional Office, and Barbara Somers, Rhode Island Sea Grant

Focus Questions — Session 2

- Based on the presentation outlining the process of disentanglement response, what improvements could be made?
- What additional fields should be added to the reporting form so adequate information is collected for each disentanglement event?
- Is there information we can collect to better determine how turtles become entangled?
- Given the presentation on the entangled turtle's constriction wound, how should injuries/suspected injuries from entanglements be evaluated?
- What type of injuries have sea turtles sustained from entanglements in vertical lines? How could these injuries be minimized? Is there a certain type of line that may reduce the severity of constriction wounds?
- What additional outreach measures can be taken to improve reporting?
- What factors prevent people from reporting entanglements? How could these factors be alleviated?
- Is there concern regarding the consequences of reporting entanglements to NMFS in the fishing community?
- What are the benefits for training fishermen to disentangle turtles safely and properly? Would fishermen be willing to attend training on proper disentanglement?

Improving disentanglement response

Several issues were discussed in relation to improving disentanglement response, including when the STDN should respond to an entanglement call, whether fishermen should act as responders (with particular sensitivity to ESA take issues), and what tools should be developed or used to improve response and avoid reporting inaccuracies.

Participants seemed very interested in the topic of how and when STDN responders determine if they should respond to an entanglement call. A concern was the use of resources when the exact location of the entangled turtle is not known. Often when a caller reports an entanglement, unless they have specific GPS coordinates, they are not able to give an accurate description of the entanglement location. Additionally, leatherbacks have been known to carry gear across large distances. For example, in 2005 an adult leatherback was confirmed to have carried a single pot over 14 nautical miles, through Cape Cod Bay, from Wellfleet to Provincetown. The leatherback was first photo documented by a boater on 4 September 2008, in Wellfleet, Mass.; however, responders were unable to relocate the animal. The following day that same animal was documented and disentangled in Provincetown. Photo documentation of the markings on the animal and the gear allowed for responders to confirm that both events involved the same animal. Although it is known that leatherbacks have the ability to carry gear, many factors likely affect how fast the animal will travel, including bottom condition, weight of gear, and health of the animal. Therefore it is important for the reporting source to stay with the turtle until STDN responders arrive. Several responder participants noted that if the reporting source cannot stand-by and doesn't have an idea on the direction of travel, the possibility of relocating that animal is very small. Currently NMFS recommends that responders use their judgment regarding whether to respond to a report based the information they have received on the location of the animal and weather conditions. Most responders who participated in the workshop felt that it was better to make an effort to locate the animal, as long as it is safe to do so and a response boat is available. NMFS has always put human safety above disentanglement response; therefore, the agency has always recommended that responders

stand down if weather conditions are not favorable and may cause safety concerns during the disentanglement response. Participants suggested that a decision-tree for STDN response, with NMFS recommendations, could help clarify when to respond.

Another discussion point was whether fishermen could act as “official” responders. Anecdotal information indicates that some fishermen may disentangle turtles when they are found in their gear, however, fishermen may not be comfortable disentangling animals from another fisherman’s gear. A few participants noted that fishermen may not be likely to report entanglements, but they may be willing to receive training and information on how to safely disentangle turtles. It was suggested that NMFS initiate an incentive program to “certify” fishermen as responders, and offer some type of compensation and/or recognition for their disentanglement efforts. However, other participants noted that fishermen are not authorized under the ESA to disentangle a threatened or endangered species, which hampers fisherman participation.

Finally, suggestions were made regarding the development of improved cutting tools, such as using a laser cutter or cast remover, which could facilitate rapid disentanglement of the turtle and improve response time. The suggestion was made to mark dead animals that have been disentangled to prevent double-counting if the animal should later wash up on shore. Simple visual markers that last, such as a paint stick and/or flipper tags, could be useful tools.

Reporting form improvements

Updated last year, the Sea Turtle Entanglement Report Form contains fields for detailed information on an entanglement. NMFS asked the workshop participants for feedback on the form and potential improvements. General suggestions included a space for the time observed and released and clarifying that latitude/longitude pertains to all entanglements, not just on-shore strandings. Participants felt that it would be useful for NMFS to share information from the entanglement to the stranding network and fishermen.

Several suggestions for additions to the form addressed gear-related information, such as the location of the gear, where the animal is entangled in the gear, the gear weight, impingement on other gear, and the number and location of wraps on the turtle. Several participants suggested adding a checklist of descriptive options for responders to note the condition of the turtle (e.g., blood/no blood, swelling, laceration, etc.).

Another idea was to develop one form for STDN responders (or continue use of the current form) and a second form for fishermen responders. The fishermen form would have a detailed gear section, while the STDN form would focus on the condition of the animal. It was noted that the disentanglement responder form is already different from the follow-up interview form used by NMFS, which is mainly used to collect information on where the gear was originally set, soak time, target catch, etc. Participants also noted that the form(s) should not be too long or complicated, which could lead to misinformation, or dissuade fishermen and responders from filling the form out completely, or at all.

There was some discussion on the gear identification information that is requested on the form. The information provided would help identify the person who owned the gear, when the gear was last fished, gear configuration, etc. Some of the industry participants noted that they may know this information about the local fishermen in their particular area, but would be reluctant, as a responder, to report that information on the form. It was suggested, rather than writing down the owner/gear info on the form, there could be a check box noting that the fisherman responder has called the gear owner. Also, it was suggested that a gear identification box should be added to the form, even if it is not filled in at the time of response.

Minimizing and evaluating entanglement injuries

Entanglement in vertical lines may result in constriction wounds, rope burns, or cuts to the animal. In addition, the severity of the injury may be unknown or visible at the time of disentanglement, as some constriction-related injuries may develop after a period of time.

However, it was suggested that a key or some other tool be created to help responders evaluate or estimate injuries from an entanglement based on the number of wraps, the position of the wraps, and the length of time entangled (if known). It was noted that more information is needed to determine the difference in injuries between an animal that has dragged gear for a period of time, versus an animal that was anchored and disentangled in the same location of its entanglement. Anecdotal evidence may suggest that injuries to turtles disentangled at the original entanglement location are less than animals known to have carried gear for extended periods of time.

Additionally, variations in the degree of entanglement (i.e., number of wraps) were noted, which may factor into the level of potential injury associated with the entanglement. Participants noted that some animals are found to have very light entanglements, with one or two loose wraps, while other animals had multiple wraps, some very tight around the flipper or neck. Some participants noted that animals with more complicated entanglements often appear more lethargic.

As mentioned above, several participants noted that the development of a health assessment protocol or key for interpreting injuries would be helpful in accurately evaluating entanglement injuries. Participants posed the question of whether it was possible to establish “survive” or “not likely to survive” parameters for entangled sea turtles. It was suggested that a protocol modeled after the marine mammal studies with dolphins and whales might be useful. Additionally, participants stated that more research be conducted on methods to safely and effectively rehabilitate leatherbacks. Historically, leatherbacks have not responded favorably to the confinement of a rehabilitation pool. However, the ability to rehabilitate entangled leatherbacks could be extremely helpful in evaluating and treating injuries.

Overall, the discussion of this topic indicated that more information is needed to understand the implications of the length of time an animal is entangled, the effects of dragging gear, and the number/location of line wraps.

Outreach to improve public awareness and increase reporting

The breakout groups discussed ideas for additional outreach measures to help improve entanglement reporting. It was suggested that consolidating all responding network numbers to one toll free telephone number would be helpful for the public.

Other outreach ideas directed to the general public included development and better distribution of outreach materials, such as a website, wheelhouse card, posters, flyers, and stickers at marinas and other places where people congregate (boat shows, recreational fishing shows) and identifying which media are most effective in distributing information. In addition, messages to the public should note that turtles may become entangled in any line in the water, and they can help most by reporting entanglements, but should not attempt to disentangle the turtle.

Training was another aspect of outreach discussed. It was suggested that NMFS cross-train fisheries observers in sea turtle disentanglement, should they encounter an entangled turtle while on a fishing vessel. It was also suggested that additional training be provided for local, state, and Federal officials that are already on the water and possibly available to respond to entanglements.

The breakout groups also spent some time discussing outreach needs targeted specifically at fishermen to both improve reporting and increase their knowledge about sea turtle entanglements. It was suggested that an anonymous hotline be set up to encourage fishermen to report entanglements. However, concerns were raised that even anonymous reports may result in more regulations, and therefore, fishermen may continue to withhold reporting information. In order to evaluate the degree of sea turtle interactions with vertical lines, more data on the number and locations of entanglements are needed, particularly from animals that are disentangled by fishermen and never reported.

Several participants suggested that there is a need to engage the fishing industry and directly address the advantages and disadvantages of reporting takes. It was suggested that

NMFS identify possible incentives for fishermen to report entanglements, and attempt to find a solution to the “perceived” cost by fishermen. Several participants suggested possible incentives could include disentanglement training, certification, and disentanglement tools that are tailored to a small boat (i.e., a mini kit with only the critical tools not already on a fishing boat). Some participants also suggested that fishermen may be more likely to report if NMFS could provide incidental take coverage for entanglements in their gear, and monetary compensation for reporting and/or disentanglement. NMFS participants noted that monetary compensation from the agency was not possible.

Finally, participants suggested that sharing information between researchers across regions and countries is vital to improving entanglement response. Future workshops were suggested to continue the conversation on this topic. It was recommended that a follow up meeting be held specifically for researchers, so that they can continue to share experiences, new developments, new technologies, and changes in research needs.

Future Steps

Participants identified several concerns, issues, and potential solutions related to interactions between vertical lines and sea turtles. The organizers appreciate all the suggestions and comments that were provided, as they contributed greatly to the success of the workshop.

At the closing of the workshop, it was stated that NMFS will review all the suggestions provided and prioritize areas for further investigation. NMFS looks forward to working cooperatively with workshop participants and other interested stakeholders as they continue to move towards solutions. It was also noted that future steps may include follow-up meetings with stakeholders, research, and improvements to protocols.

Appendix I

Workshop Agenda

March 31, 2008

- 1:00 pm Opening Remarks**
David Beutel (University of Rhode Island/Rhode Island Sea Grant)
- 1:10 pm Endangered Species Act & Sea Turtle Life History**
Carrie Upton (NOAA)
- 1:30 pm Sea Turtle Distribution and Seasonality**
Michael James (Dalhousie University) · Eastern Canada
Kara Dodge (University of New Hampshire) · Northeast U.S.
Sue Barco (Virginia Aquarium Stranding Response Program) · Virginia
- 2:00 pm Data on Sea Turtle Interactions with Vertical Lines in the Northeast U.S.**
Sara McNulty (NOAA)
- 2:30 pm Afternoon Break**
- 2:50 pm Sea Turtle Disentanglement Network Equipment and Response**
Brian Sharp (Provincetown Center for Coastal Studies)
- 3:20 pm Case Study: Traumatic Injury from a Constriction Wound on an Entangled Green Sea Turtle: Implications for Sea Turtle Disentanglement?**
Linda D'Eri and Sue Barco (Virginia Aquarium Stranding Response Program)
- 3:40 pm ALWTRT: Overview of Research and Gear Modifications, As Related to Vertical Lines**
Diane Borggaard (NOAA)
- 4:10 pm Gear Demonstration: Different Fisheries, Surface System Set-ups**
Glenn Salvador (NOAA) and Industry volunteers
- 4:45 pm Closing**
David Beutel (URI/Rhode Island Sea Grant)

April 1, 2008

- 8:00 am Breakfast**
- 8:30 am Overview of Presentations, Description of the Day's Activities**
Dave Beutel (URI/Rhode Island Sea Grant)
- 8:45 am Break Out Session 1:**
Options for the prevention of entanglement

10:45 am	Morning Break
11:05 am	Break Out Group Reports: Presentation of ideas by a group representative
12:15 pm	Lunch
1:00 pm	Break Out Session 2: Options for improving disentanglement
3:00 pm	Afternoon Break
3:20 pm	Break Out Group Reports: Presentation of ideas by a group representative
4:30 pm	Closing Remarks, Final Thoughts, Questions, Comments David Beutel (URI/RI Sea Grant)
5:00 pm	Conclude

Appendix II

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Appendix III

Presentation Slides

A. Opening Remarks

David Beutel, Rhode Island Sea Grant/University of Rhode Island

Interactions Between Sea Turtles and the Vertical Lines of Fixed Fishing Gear

March 31-April 1, 2008
The Village Inn Resort
Narragansett, Rhode Island

National Marine Fisheries Service Protected Resources Division

Rhode Island Sea Grant

Ground Rules

- Do more than belong: participate.
Do more than care: help.
Do more than believe: practice.
Do more than be fair: be kind.
Do more than forgive: forget.
Do more than dream: work."

William Arthur Ward



- "Behold the **turtle**. He makes progress only when he sticks his neck out."

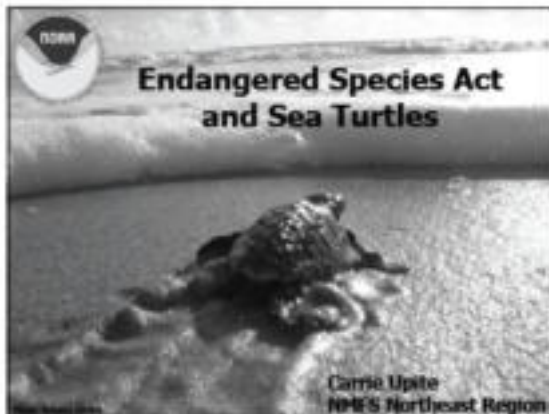
Ground Rules

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Do more than dream: work."

William Arthur Ward

B. Endangered Species Act and Sea Turtle Life History

Carrie Upite, NMFS Northeast Regional Office



What do we know?

- Sea turtles occur in Northeast and Mid-Atlantic waters
- Turtle distribution overlaps with fixed fishing gear
- Turtle entanglements in vertical lines have been documented
- Disentanglement Network was established to safely remove gear from entangled turtles

Why are we here?

- To bring interested parties (industry, federal and state agencies, academia, turtle responders, NGOs) together to begin discussing sea turtle and vertical line interactions
- To gather information from individuals with the most experience with sea turtles, fishing gear/vertical lines, and/or entanglement events
- NOT to make any consensus based decisions for immediate implementation

What are the goals for this meeting?

- To attempt to learn how and why turtles become entangled in vertical lines
- To consider solutions that may reduce future entanglement
- To identify ways for improving disentanglement response and reporting

Endangered Species Act

- Purpose (Section 2)
- Definitions (Section 3)
- Species listing, critical habitat and recovery (Section 4)
- Land Acquisition (Section 5)
- State Cooperation (Section 6)
- Consultations (Section 7)
- International Cooperation (Section 8)
- Take Prohibitions (Section 9)
- Take Exceptions (Section 10)

Purpose (Section 2)

- Conserve the ecosystems that endangered and threatened species depend on
- Provide a program for the conservation of endangered and threatened species
- Take steps to achieve the purposes of existing treaties and conventions affecting wildlife, fish, and plants

Section 9 Prohibitions

It is unlawful for any person subject to the jurisdiction of the U.S. to:

- (A) import into or export from the U.S.;
- (B) take any such species within the U.S. or the territorial sea of the U.S.;
- (C) take any such species upon the high seas;
- (D) possess, sell, deliver, carry, transport, or ship in interstate or foreign commerce;
- (E) deliver, receive, carry, transport, or ship in interstate or foreign commerce;
- (F) sell or offer for sale in interstate or foreign commerce any such species; or
- (G) violate any regulation pertaining to such species or to any threatened species of fish or wildlife.

Definitions (Section 3)

- **Take** = harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct
- **Endangered** = any species in danger of extinction throughout all or a significant portion of its range
- **Threatened** = any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range

Exceptions to Section 9 Prohibitions

- Section 7 consultations
 - Incidental take statements (included in Biological Opinions issued through formal consultation)
- Section 10
 - Scientific research permits (10(a)(1)(A))
 - Incidental take permits (10(a)(1)(B))

How does a species become delisted?

- Can be considered if recovery criteria are met (as identified in respective species recovery plans)
- Status review team convenes to assess status



NMFS NER Protected Resources Division

- Implement the Marine Mammal Protection Act (MMPA)
- Implement the Endangered Species Act (ESA)



Where
is the
Northeast
Region?



What species are listed in the NER?

- Atlantic Salmon
- Sea Turtles
- Shortnose Sturgeon
- Whales



Sea Turtle Species in the Northeast Region



Leatherback sea turtle (*Dermochelys coriacea*)



- Endangered on ESA
- Highly migratory, oceanic
- Largest turtle - adults reach 6 ft long and 1400 lbs
- Shell of black rubbery skin with ridges
- Diet of gelatinous zooplankton (jellyfish)
- Nest on tropical beaches

Loggerhead sea turtle (*Caretta caretta*)



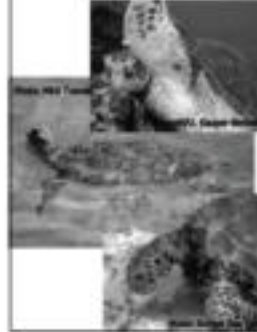
- Threatened on ESA
- Most common in US waters
- Adults range 33-40 in and 150-400 lbs
- Reddish-brown carapace
- Diet of crustaceans, mollusks, fish
- Nest on temperate or subtropical beaches

Kemp's ridley sea turtle (*Lepidochelys kempii*)



- Endangered on ESA – rarest species
- Smallest turtle - adults <30 in long and 80-100 lbs
- Broad oval olive gray/black shell
- Diet primarily crabs
- Nest on 1 beach in Mexico (some in TX)

Green sea turtle (*Chelonia mydas*)



- Endangered/threatened on ESA
- Not as common in NER
- Largest hard shelled turtle - adults 36-43 in long and 250-400 lbs
- Shell with starburst pattern
- Diet of algae and seagrasses as adults; younger eat both plants and animals
- Nest on tropical/subtropical beaches

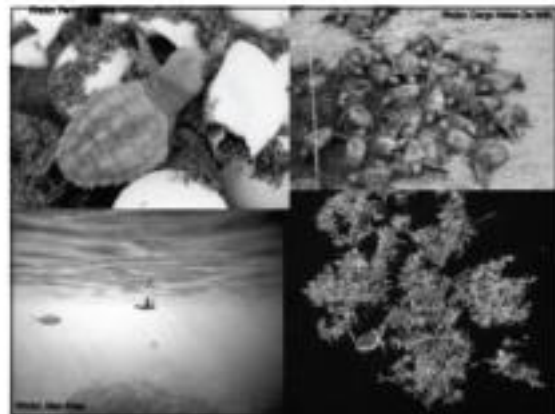
Hawksbill sea turtle (*Eretmochelys imbricata*)



- Endangered on ESA
- Rare in NER
- Adults 30-35 in long and 100-200 lbs
- Tortoiseshell color
- Diet of sponges, sea urchins, algae
- Nest on tropical/subtropical beaches



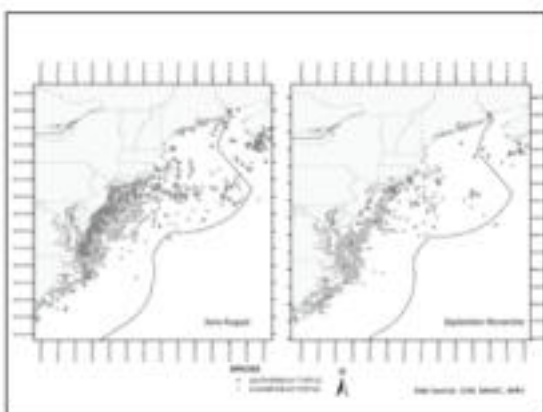
Sea turtles have a complex life history...





Importance of Northeast Waters

- Sea turtles are found north of Cape Hatteras from May-November, migrating **north** as water temperatures **increase** in spring, and **south** as they **decline** in fall
- Nearshore waters provide developmental and foraging habitats for immature and sub-adult turtles
- Pelagic waters provide foraging habitat for leatherback and loggerhead turtles



C. Sea Turtle Distribution and Seasonality – Eastern Canada

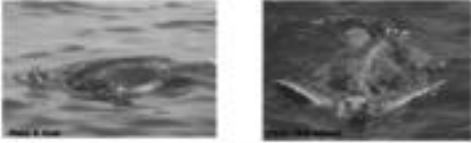
Michael James, Dalhousie University, Canada

Note: Presentation slides not available at time of publication. Please contact the author directly (see Participants List, page 20) for information.


D. Sea Turtle Distribution and Seasonality – Northeast United States

Kara Dodge, Large Pelagics Research Center, University of New Hampshire

**Distribution and Seasonality
of Sea Turtles off the Northeast US**




Kara Dodge
Molly Lutzavage
Large Pelagics Research Center
University of New Hampshire
Durham, NH 03824
USA




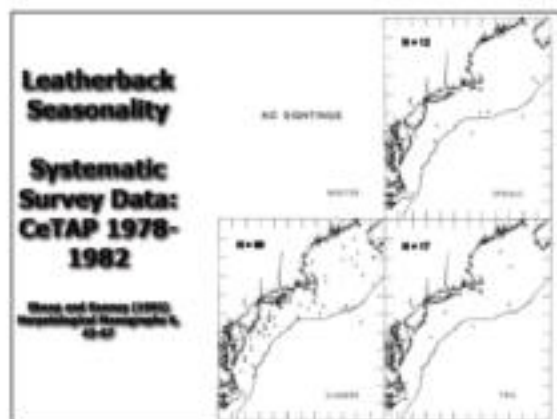
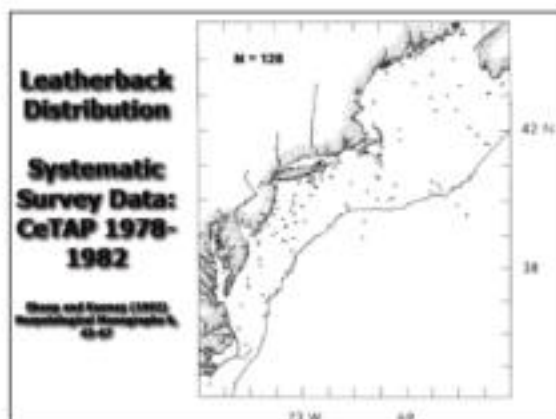
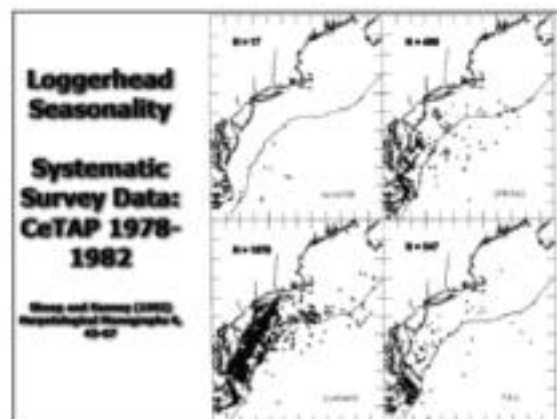
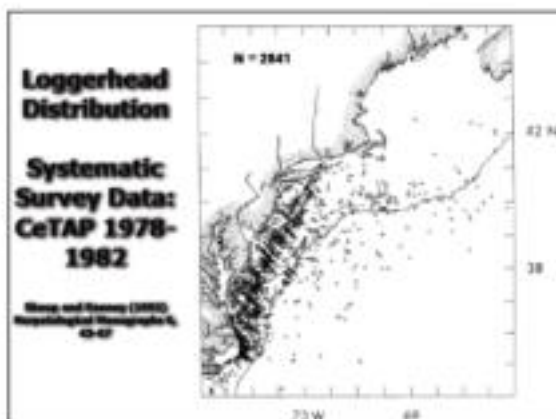
Leatherback, *Dermochelys coriacea*

- Family Dermochelyidae
- Specialized gelatinous diet
- Primarily water column feeders
- NE US: summer & fall



Loggerhead, *Caretta caretta*

- Family Cheloniidae
- Carnivorous diet
- Primarily bottom feeders in shallow coastal waters
- NE US: late spring - fall

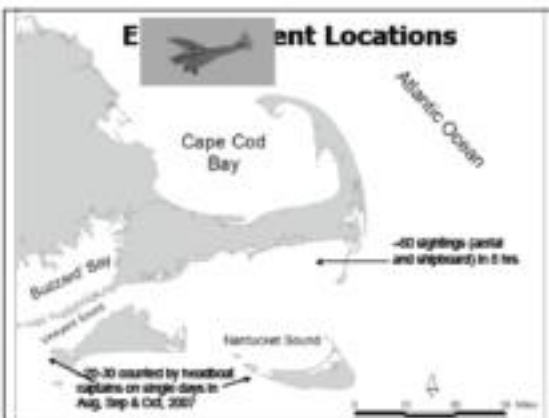
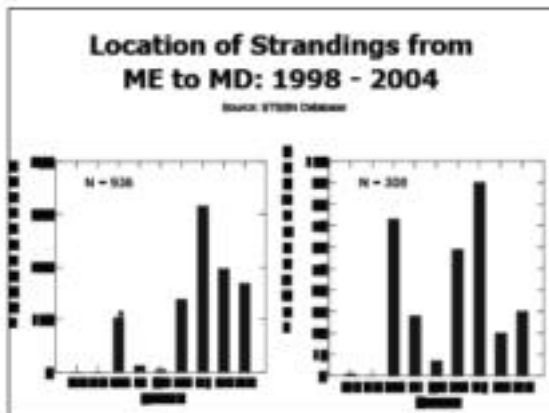
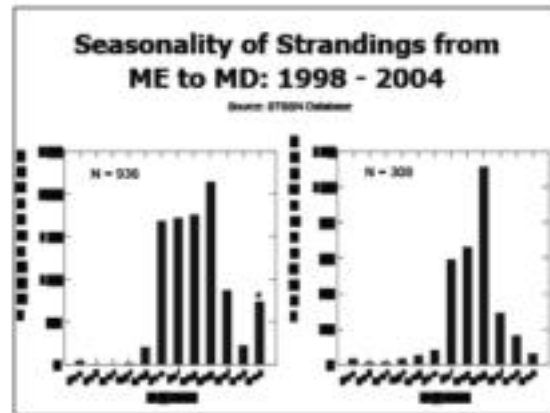



Opportunistic & Other Data Sets

- Strandings
- Sightings
- By-catch
- Telemetry data



Photo: Frank DeLuca/USFWS, NOAA



E. Sea Turtle Distribution and Seasonality – Virginia

Susan Barco, Virginia Aquarium Stranding Response Program



Sea Turtles in Virginia

5 species

- **loggerhead** (*Caretta caretta*)
- **Kemp's ridley** (*Lepidochelys kempi*)
- **leatherback** (*Dermochelys coriacea*)
- **green** (*Chelonia mydas*)
- **hawksbill** (*Eretmochelys imbricata*)



LOGGERHEAD

- most common sea turtle in VA
- only species that nests in VA
- Prey-crabs, whelk (large individuals) & fish (discards/depredation?)
- appears May to late fall

KEMP'S RIDLEY

- 2nd most common in VA, usually small, juveniles with occasional adults in stranding record
- preys on crabs & occasionally fish (bycatch/depredation?)
- appears May to late fall



LEATHERBACK

- 3rd or 4th most common stranding in VA
- appears every year, but number varies seems to compliment green strandings



- juveniles & adults in stranding record



GREEN



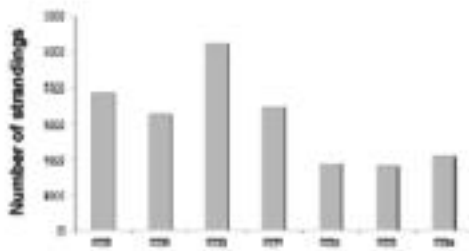
- 3rd or 4th most common stranding in VA
- usually juvenile s
- 1 nest (2005)
- strands annually, especially in late summer, early fall

HAWKBILL

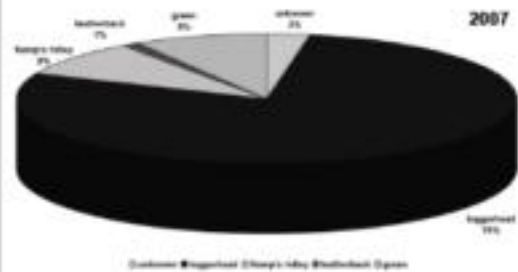
- rare in VA stranding record
- has been observed in VA two times
- possible hawksbill hybrids have stranded



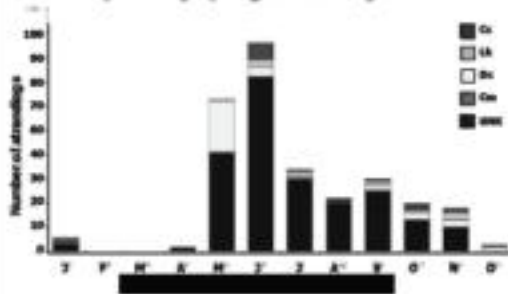
Sea Turtle Strandings in VA 2001-2007



Most strandings and most live sightings are loggerhead followed by Kemp's, then green & leatherback

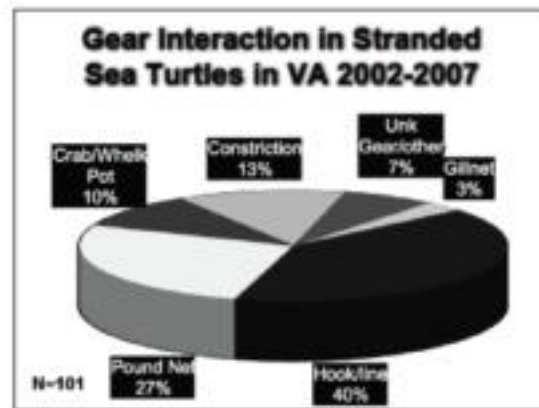
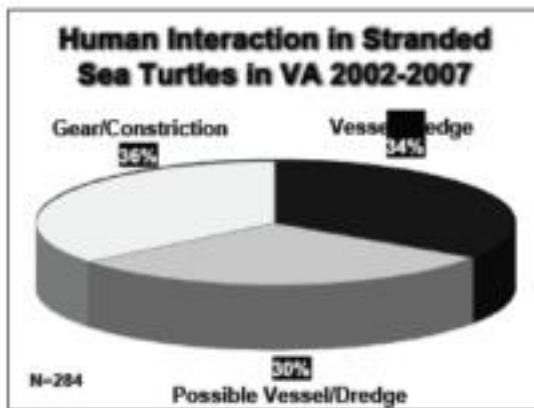


Sea turtle strandings occur seasonally, primarily spring to fall/early winter



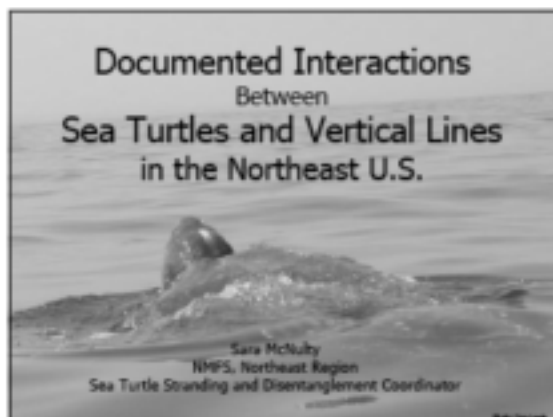
Cause of Death & Threats to Sea Turtles in VA

- **Vessel strike/dredge** (some post-mortem; difficult to assess COD in decomposed carcasses, some compromised prior to strike)
 - Co, Dc, Lk
- **Gear ingestion** (commercial & recreational)-sometimes effect unclear
 - Co, Lk
- **Debris ingestion** - effect sometimes unclear
 - Co, Dc, Lk
- **Entanglement** (monofilament line & net, whelk & crab pot buoys, pound net, trawl, purse seine?)
 - Co, Dc, Lk, Cm



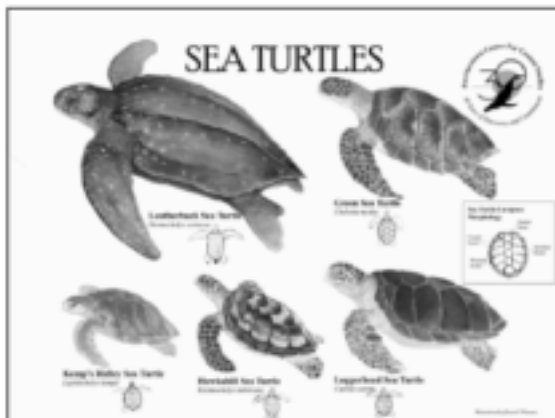
F. Data on Sea Turtle Interactions with Vertical Lines in the Northeast United States

Sara McNulty, NMFS Northeast Regional Office



Overview

- What is the STSSN?
- What is the STDN?
- How is the STDN entanglement data collected?
- What we know!



What is the STSSN?

STSSN = Sea Turtle Stranding and Salvage Network

The Sea Turtle Stranding and Salvage Network (STSSN) was formally established in 1980 to collect information on and document strandings of marine turtles along the U.S. Gulf of Mexico and Atlantic coasts.



2007 Sea Turtle Strandings

366 Total Strandings in NER *
29 Leatherbacks*

2006 Sea Turtle Strandings

431 Total Strandings in NER
43 Leatherbacks

*still preliminary data

What is the STDN?

STDN = Sea Turtle Disentanglement Network

The NMFS Northeast Region established the North Atlantic STDN in 2002, in response to an increase in the number of documented turtle entanglements in pot gear in the region. Prior to the STDN reports were collected from USCG, Fisherman, and STSSN.



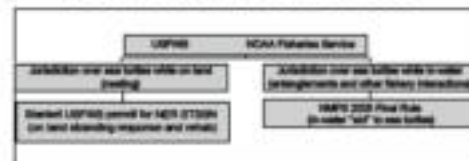
Photo: NOAA NMFS, Virginia Fisheries Stranding Program website, NOAA (right)

The Northeast Region Stranding and Disentanglement Network

Region Extends from Maine to Virginia
16 Organizations
6 Rehabilitation Facilities

College of the Atlantic Allied Whale	Riverhead Foundation
Maine DWR	Marine Mammal Stranding Center
University of New England	MERR Institute, Inc.
New England Aquarium	Maryland DWR
Walden Bay Wildlife Sanctuary	National Aquarium in Baltimore
National Marine Life Center	Virginia Aquarium Stranding Program
Myrtle Aquarium	Virginia Institute of Marine Science
*Providence Center for Coastal Studies	*Rhode Island Sea Grant

Network Authorizations



- Recreational Boaters / Fishermen
- U.S. Coast Guard
- State Marine Patrols
- Commercial Fishermen
- Aerial and Shipboard Surveys
- Ferries

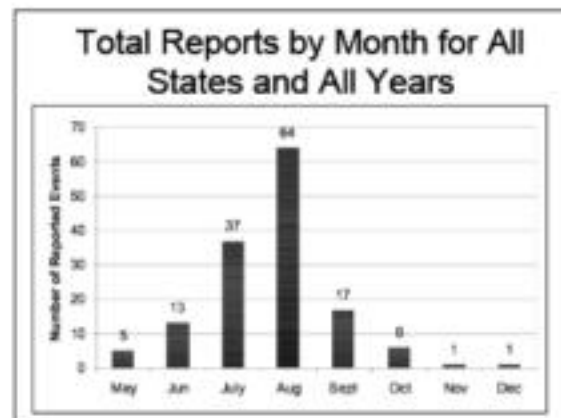
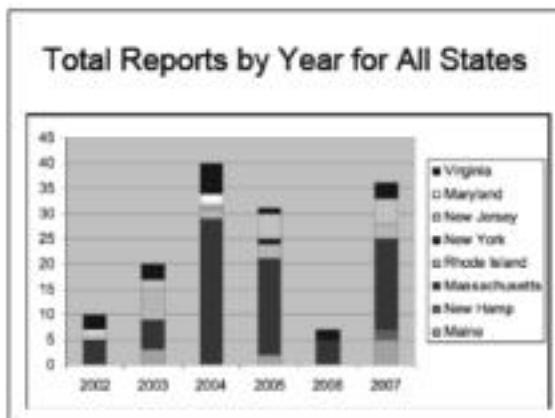
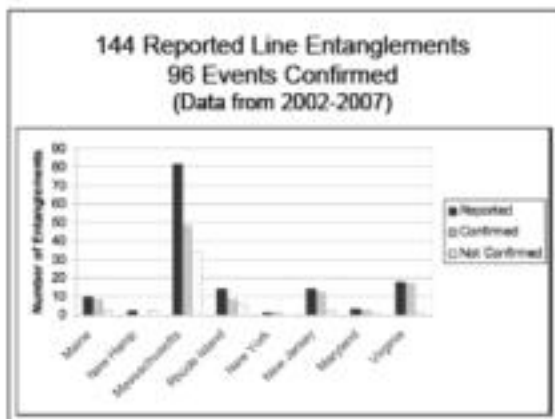


- Opportunistic – we only get reports if someone encounters a turtle AND they report it
- We are reliant on the reporting source staying with the animal until responders arrive
- Limited response areas – mainly coastal due to resources and vessel availability



Please do not reproduce any of this data without permission.

36



Confirmed Events

What is a Confirmed Report?

- Photo Documentation
- Response and Disentanglement by a trained responder
- Other Situations

96 Confirmed Events

Condition: 75 Alive
21 Dead

Species: 87 Leatherback
8 Loggerhead
1 Green

Disposition of Animals

75 Live Sea Turtles

Partially or Fully Disentangled: **72**
Collected for Rehabilitation: **2**
Turtle Shed Gear On It's Own: **1**

21 Dead Sea Turtles

Floating and/or Anchored: **12**
Stranded on Shore with Gear: **9**

Gear NMFS has Identified

- Of 96 Confirmed Events, NMFS has identified the fishery involved for 35 events

18 Lobster pot gear
13 Whelk pot gear
2 Crab pot gear
1 Sea Bass pot gear
1 Research pot

Other Identification of Gear

- Maine Marine Patrol has identified 2 additional events as lobster pot gear
- Massachusetts Marine Environmental Police identified 4 additional events as sea bass pot gear
- A commercial lobster fisherman reported that he disentangled turtle from his own gear, informed STDN it was lobster pot gear, gave details of entanglement

**Gear ID numbers not collected for NMFS verification*

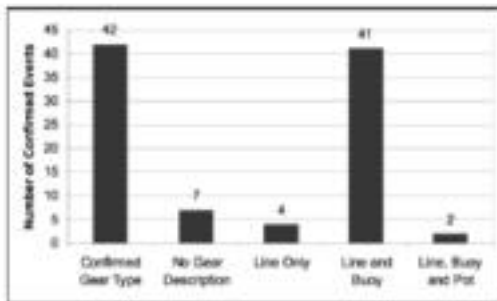
Confirmed Gear

21 Lobster pot gear
13 Whelk pot gear
2 Crab pot gear
5 Sea Bass pot gear
1 Research pot
Total = 42 events

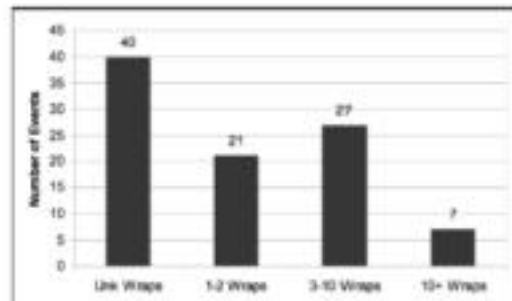
44% of confirmed events identified
29% of reported events identified



What about the other events?



Nature of Entanglement



Anchored vs. Free Swimming Entangled Animals

This is often very hard to determine, unless you observe the animal for long period of time

Anchored Animals

- unable to drag the gear with them
- susceptible to drowning

Free-Swimming Animals

- able to drag gear
- may or may not be attached to a pot

*STDN has documented events for each situation

Gillnet Gear

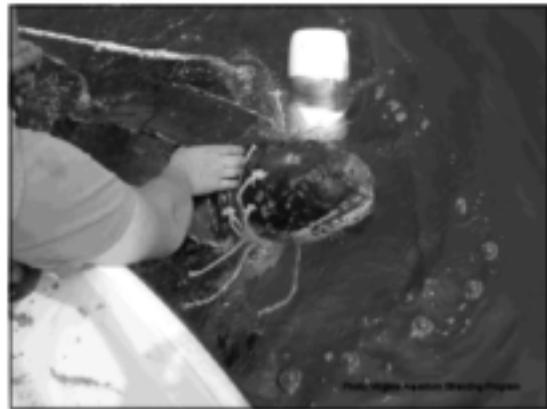
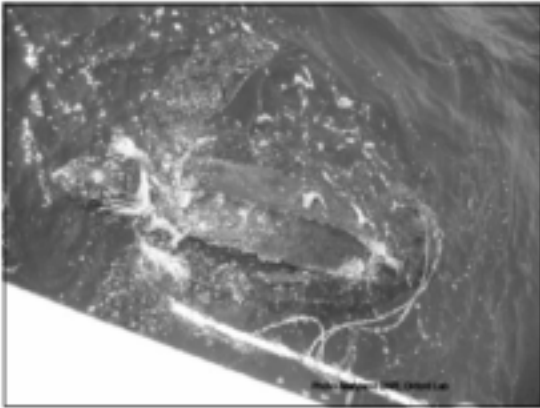
The STSSN and STDN have responded to 8 net interactions since 2002.

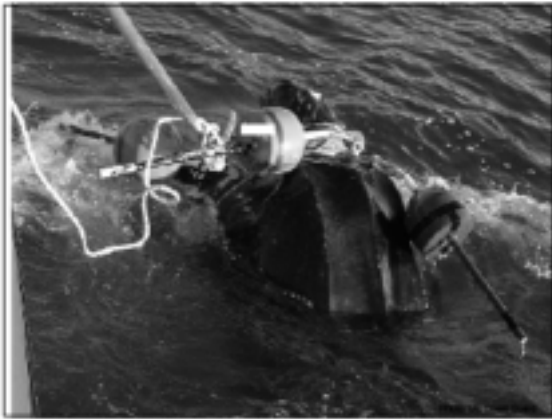
7 Dead Stranded
1 Live Disentangled

* All interactions involved netting, not a vertical line. 160 events confirmed to a fallow.

PHOTOS

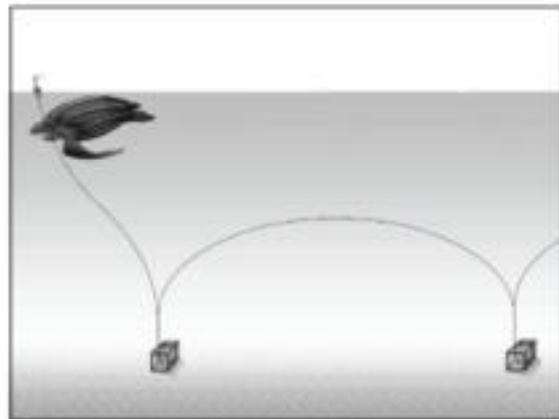
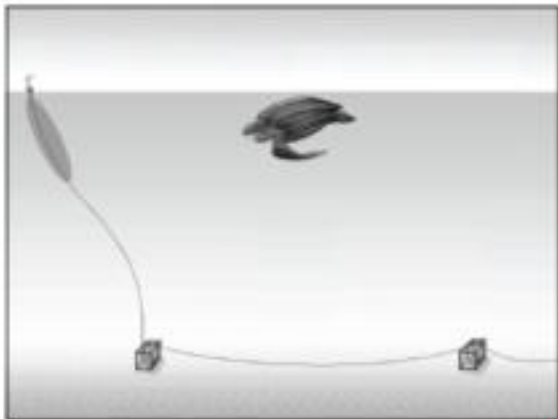
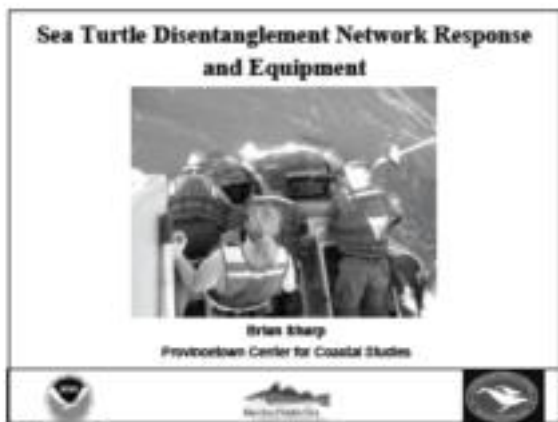






G. Sea Turtle Disentanglement Network Response and Equipment

Brian Sharp, Provincetown Center for Coastal Studies



Disentanglement Response

- Reporting
- Verification
- Standing by
- Assessment
- Documentation
- Disentanglement



Reporting

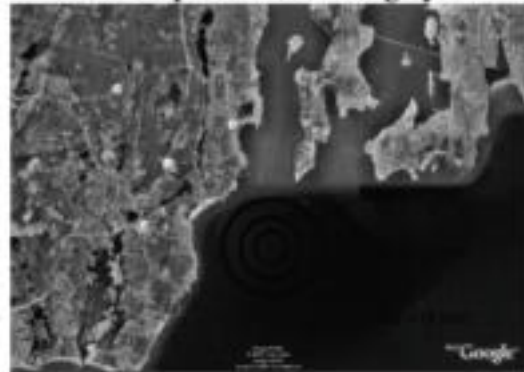
- Location (lat/long, loran)
- Report person name and vessel
- Contact # (VHF?)
- Request stand-by (>20 minutes)
- Description of turtle and buoy
- Photos or video

Anchored vs. Mobile

- | | |
|---|---|
| <ul style="list-style-type: none"> • Easier to locate • Standing by - recommended | <ul style="list-style-type: none"> • Difficult to verify • Standing by - required |
|---|---|



How important is standing by?



Anchored vs. Mobile

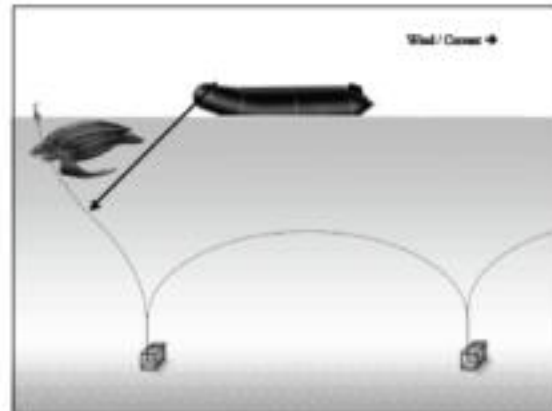
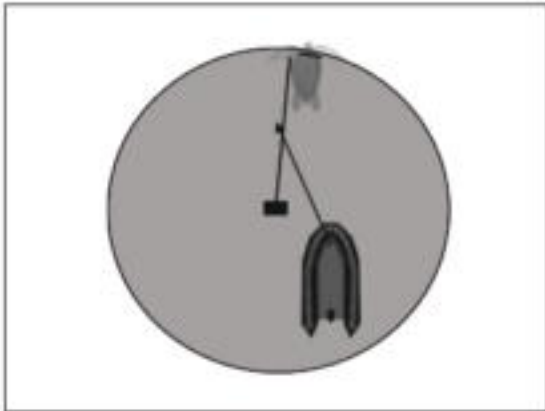
- | | |
|---|--|
| <ul style="list-style-type: none"> • Easier to locate • Standing by - recommended • May be able to drag gear • Turtle may drown | <ul style="list-style-type: none"> • Difficult to verify • Standing by - required • Difficult to attach a control line • Survivability ? |
|---|--|



Disentanglement Kits

- Safety knife
- Waterproof camera
- Neoprene gloves
- Attachment tools
- Cutting tools

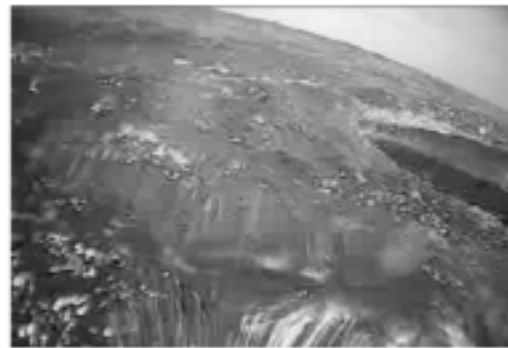




Tools for Attachment



- Deployed by aluminum poles
- Precise deployment
- Control weight bearing lines
- Gear collection
- Temporary gear marker



Tool for Evasive or Free Swimming Turtles



- Allows attachment of control line
- Trailing or angled line needed
- Works on line with a bitter end
- Can cause injury to turtle

Disentanglement Options

Unwrapping

- Safer, leaves gear intact
- Situation dependant



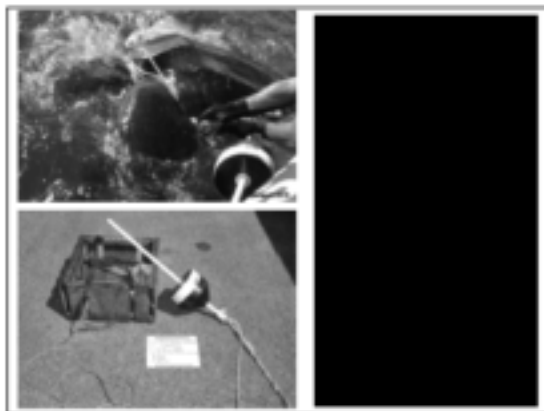
Cutting

- Higher chance of inflicting injury
- Can result in ghost gear



Safety

- Animal hazards
 - Biting?
 - Crushing
- Line handling
 - Wear gloves
 - Never hand wrap
- Vessel stability
- Personal equipment
 - PFD
 - Safety knife
- Never get in the water



Gear Documentation

Owner/Captain Interview

Importance of Documentation

Importance of Documentation

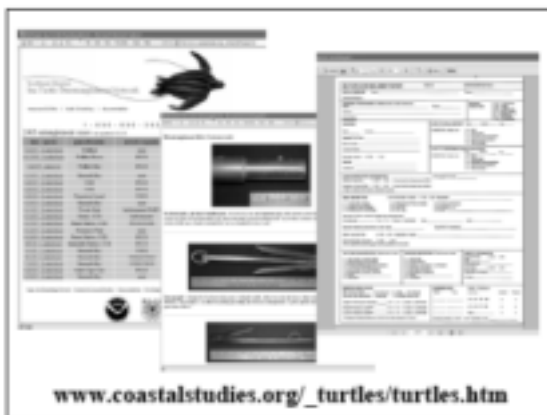
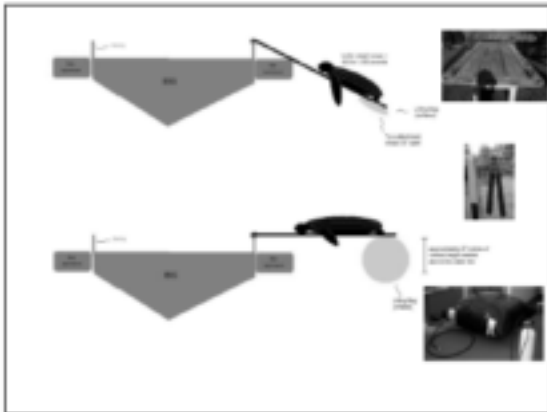
MASTON documented two occurrences of multiple entanglement events by individual turtles in one season

29 August 2007

17 September 2007

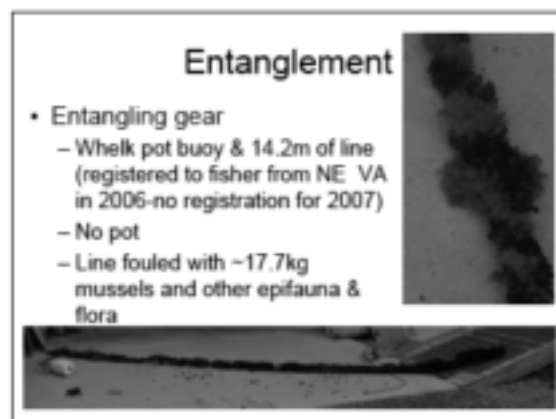
20 September 2007

1 October 2007



H. Case Study: Traumatic Injury from a Constriction Wound on an Entangled Green Sea Turtle: Implications for Sea Turtle Disentanglement

Susan Barco and Linda D'Eri, Virginia Aquarium Stranding Response Program



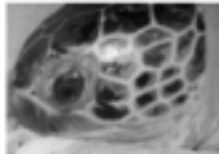
Entanglement cont.

- Description of event
 - Turtle apparently unable to submerge & listing
 - Buoy floating against turtle
 - Responders unable to disentangle from vessel
 - Single wrap around right front flipper
 - Loosely twisted forming constriction
 - Line twisted on itself



Initial Assessment

- Flipper: circumferential constriction lesion
 - Superficial abrasions
 - Significant impression
 - No swelling or edema
- Left eye inflammation (line/buoy rubbing eye?)

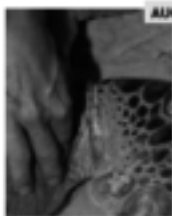
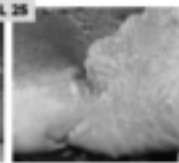


Standard Treatment Protocols

- Systemic Antibiotics (assumed aspiration pneumonia):
 - Polyflex; 10 mg/kg
 - Amikacin; 5mg/kg loading dose; 2.5mg/kg
- Nutritional Supplementation
- Flipper Treatment every 3 days
 - 10% betadine solution
 - Applied silver sulfadiazine (SSD) cream
- Eye Treatment every 3 days
 - Flush with 2% betadine solution
 - Applied triple antibiotic ointment

Wound Progression

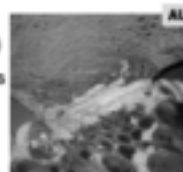
- No lameness
- No swelling
- Normal flipper use (once disentangled)



- Slight lameness
- Slight tissue sloughing
- No swelling
- Color normal

Wound Progression (cont)

- Complete lameness
- Swelling, edema & discoloration
- Necrotic pockets



- Complete lameness
- Severe swelling, edema & discoloration
- Deep tissue necrosis
- Bone visible in 3 areas



Disentanglement Implications

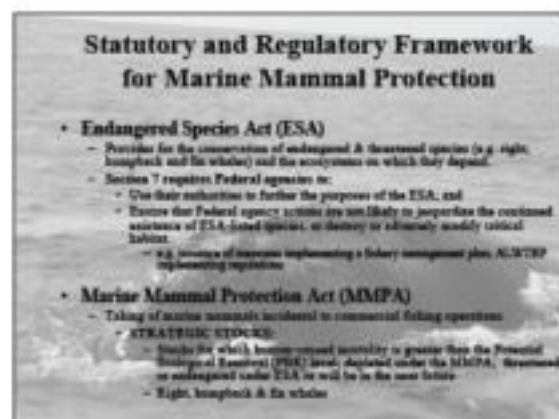
- Apparently minor wounds may degrade post disentanglement developing into serious injuries, debilitation and possibly death
- Questions asked of veterinary professionals:
 - Is there a way to diagnose pressure necrosis injuries in the field?
 - What factors would affect the development of necrosis?
 - Is there a one time treatment to mitigate wound development?
 - What are the animal welfare implications of releasing an animal with a potentially serious wound?
 - Would the animal have survived without treatment?

Acknowledgements

- Mostly the major efforts of VAQS staff and Consults with Connie Merigo and NEAQ staff
- Jean Beasley at Topsail Sea Turtle Hospital
- Sue Schaff at Marathon Sea Turtle Hospital
- Veterinarians and Specialists:
 - Dr. Robert George, Aquatic Animal Medicine
 - Dr. Jacque Schuder, Aquatic Animal Medicine
 - Dr. Brad Nadelstein, Beach Eye Care
 - Dr. John Sangenaro, Dominion Equine
 - Dr. Kenneth McIntyre, Wound Care and Hyperbaric Medicine

I. Atlantic Large Whale Take-Reduction Plan: Overview of Regulations and Research Related to Vertical Lines

Diane Borggaard, NMFS Northeast Regional Office



Marine Mammal Protection Act (MMPA)

- Regulations governing the incidental taking of marine mammals in the course of commercial fishing operations:
 - Establishment of take reduction teams for strategic stocks of marine mammals (e.g. right, humpback and fin whales) which interact with certain fisheries (i.e. Category 1 and 2)
 - Development & implementation of take reduction plans (e.g. ALWTRP)
 - Immediate Goal:
 - to reduce, within 6 months of its implementation, the annual mortality or serious injury of marine mammals incidentally taken in commercial fishing operations to levels less than PBR.
 - Long-Term Goal:
 - to reduce, within 3 years of its implementation, the incidental mortality or serious injury of marine mammals to insignificant levels approaching a zero mortality and serious injury rate. (MMPA 115/PBR)

Atlantic Large Whale Take Reduction Team and Plan (ALWTRT/P)

- ALWTRT established in 1996
 - Purpose:
 - Reduce the serious jeopardy/mortality of right, humpback, and fin whales (plus other baleen whale species)
 - to reduce gillnet and trammel net fishing
 - Process:
 - Develop a consensus plan to reduce mortality and serious injury to acceptable levels
 - MMPA sets 1997 recommendations into consideration when developing the plan
 - Goal:
 - Reduce serious injury and mortality to < PBR and then to insignificant levels (10%PBR) (PBR=0 for Right, 1.7 for Humpback, 4.7 for Fin Whales)
 - Composition:
 - Fisheries/industry associations, environmental groups, state and federal fishery managers, biologists, and other interested parties
- ALWTRP first implemented in 1997:
 - Amendment:
 - Transmitted from state to meet ESA and MMPA goals



ALWTRT/P

Commercial Fisheries that have been involved/regulated:

- Northeast Mid-Atlantic American lobster trap/pot
- Northeast rock gillnet
- Southernmost U.S. Atlantic shark gillnet
- Southern Atlantic gillnet
- Off Mid-Atlantic gillnet

Commercial Fisheries that have recently been involved/regulated:

- Atlantic striped species trap/pot (e.g. English, Jewish crab, red crab, black sea bass, spot)
- Atlantic blue crab trap/pot
- Northeast drift gillnet
- Northeast Anchored Boat gillnet

ALWTRP

- Non-Regulatory Component
 - Extensive Gear and Biological Research Program
 - Fishermen outreach/education
 - Disentanglement Program
 - Right Whale Surveillance Program
- Regulatory Component
 - Exempted areas
 - Time/area closures
 - e.g. Great South Channel
 - Gear modifications
 - e.g. weak links, sinking/neutral buoyant line, gillnet anchoring requirements
 - Seasonal Area Management Program
 - Dynamic Area Management Program

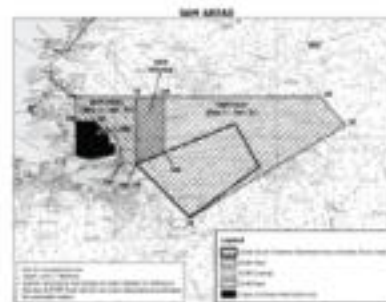


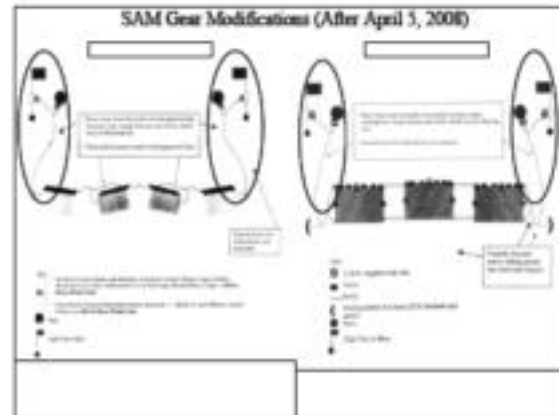
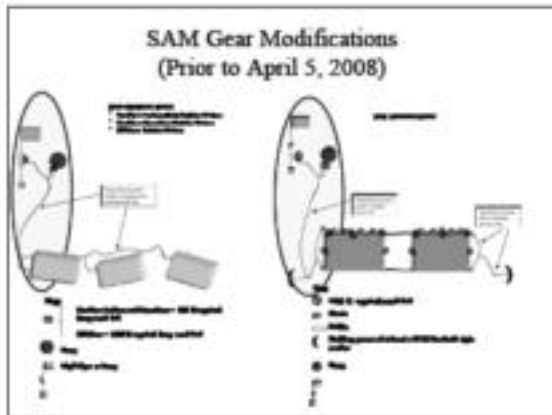
Current ALWTRP & Vertical Line Gear Modifications

- Universal
 - No floating buoy line at surface
 - Fishermen encouraged to maintain knot-free buoy lines
- Area Specific
 - Gear marking
 - Weak links on flotation and/or weighted devices attached to the buoy line
 - Sinking and/or neutrally buoyant line used for at least 20% of buoy line
 - Minimum number of trapstone buoy line (federal waters)

Seasonal Area Management (SAM) Program

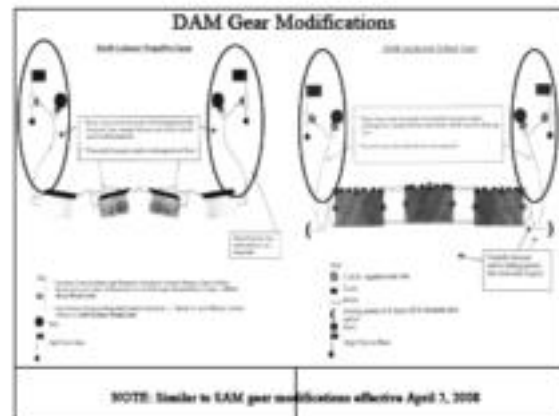
Restricted areas based on annual predictable concentrations of right whales





Dynamic Area Management (DAM) Program

- Protects unexpected aggregations of right whales north of 40 degree North latitude
- Temporary restrictions on lobster trap/pot and anchored gillnet for a 15-day period
- DAM zones have ranged between 325-3500 sq. nm.
- Once DAM zone triggered, NMFS authorized to:
 - Require removal and no setting of gear (mandatory);
 - Require removal and no setting of gear (voluntary); and/or
 - Allow modified gear determined by NMFS to sufficiently reduce the risk of entanglement.
- Program expires April 5, 2008



2003 ALWTRP Meeting

- Overriding principles agreed upon:
 - Reduce risk associated with vertical lines
 - Reduce profiles of all groundlines
- Team proposals focused on options for groundlines:
 - sliding neutrally buoyant line
 - "low profile" line
- Many members proposed that research efforts should immediately focus on ways to reduce risk associated with vertical lines

ALWTRP Broad-Based Final Rule

- Maine through Florida
 - Out to EEZ
- Management areas with year-round (Northeast) or seasonal (Mid and South Atlantic) requirements

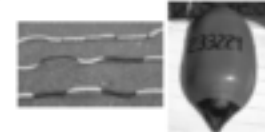
ALWTRP Broad-Based Final Rule

- Broad-based gear modifications (e.g. sinking/neutrally buoyant groundline, expanded weak link requirements)
 - Most measures effective April 1, 2008
 - Broad-based sinking and/or neutrally buoyant groundline requirement effective October 1, 2008
- Extend ALWTRP regulations to other trap/pot fisheries (e.g. hogfish, Jonah crab, shrimp, red crab, black sea bass, and conch/whelk)



ALWTRP Broad-Based Final Rule (cont'd)

- SAM and DAM programs eliminated
 - DAM eliminated when most of broad-based requirements effective
 - SAM areas expanded
 - SAM expires when broad-based sinking and/or neutrally buoyant groundline effective
- Expand gear marking for all fisheries & areas
- ALWTRP regulatory language changes
 - E.g., modified sinking and neutrally buoyant lines definitions



ALWTRP Broad-Based Final Rule (cont'd)

Modify exempted areas (inshore areas for ALWTRP and > 280 fathoms for sinking &/or neutrally buoyant groundline)



Additional Issues Identified During Rulemaking

- Low profile Groundline
 - Does lowering the profile of groundline to depths other than the ocean bottom reduce the potential for large whale entanglement?
 - If so, what is the appropriate depth and for what areas?
 - Information on large whale prey distribution & foraging behavior, methods to reduce the profile of groundlines, etc. needed.
- Vertical line
 - Additional information needed to reduce risk associated with vertical line
 - Further rulemaking

ALWTRP Meetings

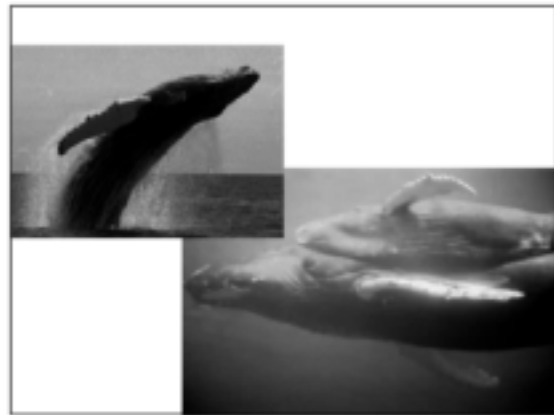
- Further discussion of ALWTRP principles
 - Groundline
 - Additional discussion of "low profile"
 - Vertical line
 - NMFS Matrix of options available to date:
 - Reducing risk associated with vertical lines
 - » Surface system (e.g. reducing spacing between buoys in the surface system)
 - » Weak links
 - Reducing the number of vertical lines
 - » Increasing the number of traps/pots or nets per fathom of string
 - » Acoustic release
 - » Galvanic time release

ALWTRP Vertical Line Model

- Model being developed to support NMFS' ALWTRP Vertical Line Strategy
- Model is designed to address spatial questions fundamental to species conservation and fisheries management:
 - Where do particular fisheries operate?
 - Where are concentrations of vertical line greatest?
 - Do whales frequent areas with high line concentrations?

ALWTRP Vertical Line Model (Continued)


- Includes American lobster, gillnet, and other trap/pot fisheries
 - Incorporates gear configurations
- Examines all waters covered by the ALWTRP
 - State and federal waters
- Will focus on period from 2000 through 2006
- Estimates fishing activity by month and location of activity
 - For each month and location, model can estimate:
 1. Number of active vessels
 2. Number of vertical lines in water
- Plan to show co-incidence of whale sightings per unit effort and fishing activity



J. Gear Demonstration: Description of Different Configurations of Fixed Gear, Including Surface Systems

Glenn Salvador, NMFS Northeast Regional Office, and Industry Volunteers

National Marine Fisheries Service Northeast Region



Gear Research Team

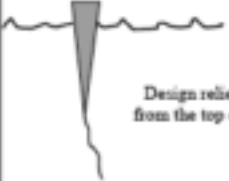
John Kenney John Higgins Glenn Salvador

Vertical Line Research

Surface Systems of Buoylines

Type of Buoy


Research & Development work by MIT Sea Grant on buoy shape, reducing appendage entanglements



Design relies on gradual transition in shape, from the top of a flexible buoy to the buoy line

Weak Links at Buoy

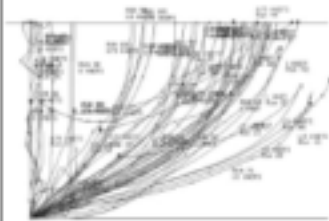
One of the first gear modifications proposed for the LWTRP



Allows buoy system to release at loads less than the attaching line

Buoy Line Research

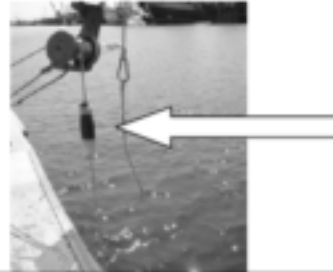
Composition of buoy line:
sink line - float line - sink/float line



Research
conducted in test
tank & at sea

Time Tension Bottom Release

Cuts buoyline away from bottom gear
when load is exerted for pre-set time



Thwartable Bottom Link

Link located where buoyline attaches to gear,
link remains weaker than hauling line until hauling,
link acoustically activated to become strong.

Buoyline Messenger System

Mark gear with low breaking strength line.
Messenger unit, equipped with traditional
hauling line, is sent down light line to lock on
to short section of heavier line at trap.

Electric Rope

Allow electrical charge to pass
through line to activate thwartable
link at trap

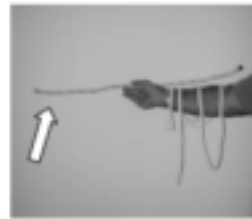
Lipid Soluable Rope

Rope that quickly deteriorates when
in contact with whale blubber

Slick/slippery Rope

Low friction rope would more easily
pass through whale baleen &
off appendages

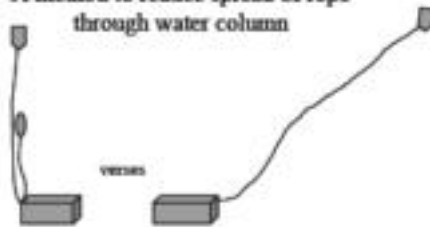
Stiff Rope



Concept of PVC pipe-like
rope in water column
transforming into a pliable
rope when hauled aboard
vessel

Two Buoy System

A method to reduce spread of rope
through water column



Visible/glow Rope



Rope of distinguishing color or glow
rope at night that would be avoided
by whales

Reducing the Number of Vertical Lines

Acoustic Release:
Eliminates vertical lines from water column
Proof of concept has been established
Unsuccessful at developing low cost system

Galvanic Link

Eliminates vertical line from water column



A device that holds
buoy & buoy line at
trap & deteriorates at
a predictable rate

